

Sump Systems									
Component Classification Categories									
Criticality	I	X					Nuclear Switchyards		
	II		X				DC, SS, TDC, TSS locations that serve O'Hare & Midway Airports		
	III			X			Locations exclusive of Criticality I & II, DC locations and ≤34kV ESS locations		
	IV				X		DC locations		
	V					X	≤34kV ESS locations		
Duty Cycle	Heavy Load	N/A	N/A	N/A	N/A	N/A			
	Normal Load	N/A	N/A	N/A	N/A	N/A			
Service Condition	In Service	X	X	X	X	X			
	Spare	N/A	N/A	N/A	N/A	N/A			
Condition Monitoring Tasks							Task Frequencies	Failure Codes	Comments
Visual inspection		5W	5W	10W	3M	6M	1c, 3d, 4b, 4e		
Time Directed							Task Frequencies	Failure Codes	Comments
Auxiliary System Maintenance		1Y	1Y	1Y	1Y	1Y	4e	Where applicable	
Sump System Maintenance		1Y	1Y	1Y	1Y	1Y	1a-e, 2a-b, 3a-d, 4a-e, 5a-e		
Failure Finding Tasks							Task Frequencies	Failure Codes	Comments
Heat Trace System Check		1Y	1Y	1Y	1Y	1Y	4f	Where installed	
Condition Directed Tasks							Task Frequencies	Failure Codes	Comments
None		N/A	N/A	N/A	N/A	N/A			

SUMP SYSTEM FAILURE MODES

FAILURE MODE	FAILURE CAUSES	MAINTENANCE TASKS
1. Pump Fails to Start	1a. Float Switch Failure	Sump System Maintenance
1. Pump Fails to Start	1b. Pressure Switch Failure	Sump System Maintenance
1. Pump Fails to Start	1c. Loss of Electrical Feed	Sump System Maintenance
1. Pump Fails to Start	1c. Loss of Electrical Feed	Visual Inspection
1. Pump Fails to Start	1d. Pump Seized	Sump System Maintenance
1. Pump Fails to Start	1e. Motor Failure	Sump System Maintenance
2. Pump Fails to Stop	2a. Float Switch Failure	Sump System Maintenance
2. Pump Fails to Stop	2b. Pressure Switch Failure	Sump System Maintenance
3. Pump Stops Prematurely	3a. Float Switch Failure	Sump System Maintenance
3. Pump Stops Prematurely	3b. Pressure Switch Failure	Sump System Maintenance
3. Pump Stops Prematurely	3c. Motor Trip (Overload)	Sump System Maintenance
3. Pump Stops Prematurely	3d. Loss of Electrical Feed	Sump System Maintenance
3. Pump Stops Prematurely	3d. Loss of Electrical Feed	Visual Inspection
4. Fails to Eject Fluid	4a. Pump Failure	Sump System Maintenance
4. Fails to Eject Fluid	4b. Piping Failure	Sump System Maintenance
4. Fails to Eject Fluid	4b. Piping Failure	Visual Inspection
4. Fails to Eject Fluid	4c. Check Valve Failure	Sump System Maintenance
4. Fails to Eject Fluid	4d. Piping Blockage	Sump System Maintenance
4. Fails to Eject Fluid	4e. Sump Pit Debris, Silt or Dirt	Visual Inspection
4. Fails to Eject Fluid	4e. Sump Pit Debris, Silt or Dirt	Sump System Maintenance
4. Fails to Eject Fluid	4e. Sump Pit Debris, Silt or Dirt	Heat Trace System Check
4. Fails to Eject Fluid	4f. Water Collection System Failure	Auxiliary System Maintenance
5. Fails to Provide Indication of High Water	5a. Local Alarm Failure	Sump System Maintenance
5. Fails to Provide Indication of High Water	5b. Scada Alarm Failure	Sump System Maintenance
5. Fails to Provide Indication of High Water	5c. Auxiliary Relay Failure	Sump System Maintenance
5. Fails to Provide Indication of High Water	5d. Pressure Switch Failure	Sump System Maintenance
5. Fails to Provide Indication of High Water	5e. Float Switch Failure	Sump System Maintenance

SUMP SYSTEM MAINTENANCE TASK DEFINITION

TASK	DEFINITION
Auxiliary System Maintenance	Functionally test and maintain auxiliary components of the sump system, where installed. Check proper operation of mechanically operated valves. Inspect and clean manholes that feed into sump system.
Heat Trace System Check	Verify proper operation and visually assess condition of heat trace wire, where installed.
Sump System Maintenance	Verify sump pump type and associated information. Clean sump pit as required. Perform sump pump functional test and alarm functional test. Ensure receipt of annunciation of alarm by the designation authority. Check proper operation of pump, pump motor, flow check valve, initiating device and control scheme. Lubricate pump as required. Inspect control cabinet. Check integrity of piping and verify adequate drainage of water away from building.
Visual Inspection	<p>This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions. These items should be checked:</p> <ul style="list-style-type: none"> - Check sump pit and building basement for excessive water - Check sump pit for debris, silt and / or dirt - Check associated plumbing / piping for cracks, leaks, or other obvious problems

SUMP SYSTEM MAINTENANCE BASIS

Sump System Template Summary

The Preventive Maintenance program is documented via maintenance templates. Templates have been developed that address transmission, substation, and distribution equipment that is owned and maintained by Exelon Utilities. Each template documents the program tasks, frequencies, failure modes, and maintenance basis for the associated equipment. Tasks and associated frequencies are designed to address known failure modes of the equipment covered by the template. In general, the tasks included in the maintenance templates are the result of good industry practices, industry experience, and manufacturer recommendations.

References:

Lombard RCI 98020361 Lombard (East) Substation Event - 8/12/03

Boundary Definition

The boundary of a sump system includes:

- Sump Pump and Pump Motor

- Sump Pit

- Sump Alarms; including wiring, aux relays, local annunciator, and remote SCADA alarms

- Power supply and control cabinet

- Plumbing and flow valves associated with the sump system

Failure Experiences

Sump pump failures are subject to ACE/RCI investigation. Findings/recommended corrective actions are incorporated into the template as required. Specifically referenced is RCI 98020361 Lombard (East) Substation Event - 8/12/03

Vendor Recommendations

Review of vendor recommendations is not practical. It is expected that the organization performing the maintenance will review the applicable vendor documentation, if available, and take any specific vendor recommended maintenance into consideration when performing Sump System maintenance.

Disposition of Vendor Recommendations

N/A

Basis for Template Tasks

SUMP SYSTEM MAINTENANCE BASIS

Auxiliary System Maintenance: Certain locations contain manholes, piping and automatic valves that function to channel runoff water into a large central sump system.

Heat Trace System Check: Proper operation of the heat trace wiring prevents freezing of water in the discharge pipes.

Sump System Maintenance: Time based periodic detailed inspection of the sump pump system to address and repair items that fail or degrade over time.

Visual Inspection: This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions.

SUMP SYSTEM TEMPLATE DEVELOPMENT HISTORY

Revision 0		Date 06/17/05
Writer	Drew Reindel (Strategic Programs)	
Reviewer(s)	11/5/04 Template Challenge Session Attendees	
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	To document the maintenance pgoram tasks, frequencies, failure modes, and maintenance basis	

Revision 1		Date 09/05/2006
Writer	Chris Stefanski (Strategic Programs)	
Reviewer(s)	George Leinhauser, Drew Reindel, Brian Graham, John Garavaglia, Miguel Ortega, G. William Lang, Tom Finchum, Darryl Mitchell, Edward Adams, Ben Kao, Caren Anders, Bill McBride, Joe Svachula, Kelvin Owens	
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	Scrub template to ensure consistency. Incorporate learnings from 1 year of implementation. Incorporate recommendations from Dearborn ACE.	

Revision 2		Date 11/17/2006
Writer	Chris Stefanski (Strategic Programs)	
Reviewer(s)		
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	Task and periodicity review / update	

Revision 3		Date 11/30/2010
Writer	Chris Stefanski	
Reviewer(s)	Ken Wendt (Mgr. Material Condition), Drew Reindel (Mgr. T&S Engineering)	
Approver(s)	Bill Fluhler , Bill Gannon, Nitin Patel, Jim Crane, Bill Sullivan	
Reason Written	Added note to ensure template changes are communicated to affected work groups.	

Revision 4		Date 04/29/2011
Writer	Chris Stefanski (Material Condition)	
Reviewer(s)	Ken Wendt, Drew Reindel, Jim Crane	

SUMP SYSTEM TEMPLATE DEVELOPMENT HISTORY

Approver(s)	Bill Fluhler (ComEd) , Bill Sullivan (PECO)
Reason Written	Modified criticality definitions and incorporated 10-week inspection task frequency

Revision CE 0		Date 04/10/2015
Writer	Chris Stefanski (Exelon Utilities)	
Reviewer(s)	Ken Wendt	
Approver(s)	Mike Moy (UFAM ComEd)	
Reason Written	Revised criticality definitions and modified document to serve as the ComEd maintenance standard.	

Revision CE 1		Date 04/25/2018
Writer	Hugo Castaneda (Material Condition)	
Reviewer(s)	Dale Player (Mgr Material Condition)	
Approver(s)	Mike Moy (UFAM ComEd)	
Reason Written	3yr review, no content changes.	

Revision 2	Revision 2		Date 08/21/2019
Writer	Kevin Chamberlain (Material Condition)		
Reviewer(s)	Eric Jenson (Substation)		
UFAM Approver(s)	Mike Moy (UFAM ComEd)		
Reason written	Modified Task Definition to require the verification that the alarm is received by the proper designated authority.		